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ABSTRACT

This paper provides a commentary on the RAMP guidelines on curriculum development in the teaching of information technology, which were developed as a result of the UNESCO seminar on harmonization held in Paris in October 1984. This report is divided into three parts: (1) basic working assumptions for curriculum planning in the face of information technology (IT) challenges; (2) colloquium themes as they relate to IT training (teaching objectives, subject matter, teaching methods, evaluation, and teaching resources); and (3) future developments in the area of computer applications and IT. A list of selected recent articles relevant to the argument is attached. (3 references) (CGD)

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TRAINING IN TECHNOLOGY AND ITS MANAGEMENT

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TRAINING IN TECHNOLOGY AND ITS MANAGEMENT

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The UNESCO seminar on harmonization held in Paris in October 1984 resulted in the commissioning of a RAMP document containing guidelines on curriculum development in the teaching of information technology. The intention was that these guidelines should give some sort of structure to course planning, and debate upon course planning, across the training programmes of the three principal information professions. It was also the intention to suggest principles which would influence course planning, and debate upon course planning, across the north-south divide. The present paper (by the same author, as it happens) is to a great extent a commentary on the RAMP guidelines, with an attempt to bring the document into the themes of the 1987 colloquium.

I. Basic assumptions in the RAMP guidelines

Some basic principles were adopted as working assumptions in the RAMP document. They are all principles which seemed to secure general agreement during the 1984 discussions, and in most cases in wider professional debate. Still, as a package, they are inevitably somewhat speculative, and some further consideration might usefully be given to the question of whether they can be fully accepted as ideas influencing the fundamental direction of curriculum planning in the face of the challenges of information technology (IT).

There is no question, of course, that the whole field of IT represents a challenge to professional training. It is a challenge that many training schools have faced. The coming of IT over the last decade or so has resulted, as we all know, in the transformation of many training schools; however there are still many that are essentially unaffected, or which have made only uncertain steps towards accommodating a technological component.

At the same time, the continuing rapid development of new technologies is constantly facing both the professions and the training schools with further puzzles. Every training course in IT is out of date as soon as it gets into the official curriculum. New graduates from an information training school must all know that what they learnt on the course must be tested

against actual new development before there can be any practical use for their skills. In these circumstances, is it possible to recognise a central body of professional knowledge relating to IT? It is one of the most important principles of the RAMP document that it is possible to do so, and that one can make an attempt to describe the subject content of the core of a central professional training. Here, then, is the first general idea:

1. It is possible to describe and promote a curriculum framework which would be suitable as a basis for course planning in IT across the three professions.

The RAMP document also argues that this core curriculum should be one that crosses the divide between developing and developed countries. The author had some misgivings about this initially. Having just come from working in a part of the world where the electricity supply was uncertain, where even the cheapest materials could not be bought in from abroad, and where there was little general consciousness of IT in the educated public, the idea that information workers from that region should be trained in advanced technology seemed unconvincing.

However as the debate continued, the principle that they should seemed to gain acceptance. We ought not to be in the business of producing two different kinds of professional, the manual and the technological. Even if for good reasons any particular information service was to be run on manual methods, it could be recognised

- (a) that the skills and disciplines imparted by IT are useful in themselves, and of course are directly useful to users. (In fact they have had a revolutionary impact on the concepts, terminology and methods of thinking in information training).

-(b) that all information professionals should visibly belong to an internationally organised body of co-workers, part of whose stock in trade is technological skills and knowledge, available to be put at the service of user communities.

2. A common core of IT training should be a necessary part of the training of information professionals in the developing world as much as in the developed world.

The more we looked at the IT curriculum, the more we were impressed by the way that technologically-based concepts, language and operations had penetrated the central subjects of professional formation, in all three professions. The structure of a bibliographic, or of an archival, description; the way bibliographic data was to be transmitted, the nature and site of access points to it; the terminology used: these are all deeply affected. Yet these are aspects, not of a training in IT, but of training in professional subjects - cataloguing, or description; provision of user service; data transfer.

It was clear that in designing a harmonized curriculum we had to deal with two quite different matters. On the one hand, there was the IT curriculum itself, allowing for training in specific technologies; on the other, there was the radical effect of IT concepts, terminology and powers on traditional professional training. (As a matter of fact, the latter area fell outside the scope of the RAMP document).

3. A curriculum for basic knowledge of IT could be devised for the information schools, and this curriculum could be planned on a harmonized basis.

4. The central subjects of professional training, specific to each of the professions, should be penetrated and changed by the advent of IT concepts and practices; therefore training courses should be restructured and rethought, each within the tradition of the profession(s) served by them.

5. Because of IT's direct relationship with users, course restructuring would normally be done in the context of national or local information services, and against a background of IT-readiness in society.

Turning back to the question of how to define, in a reasonably conservative way, the body of IT which should be contained in a core curriculum, we encountered the problem of the IT specialists in information services. It appeared possible that in the future the most influential of these services would be in the hands of specialists: people who would be more technologists than information workers, and who would constitute an elite. This prospect was viewed with some alarm, since as we all know, problems of image and status are constantly impeding the development of information services. There is no doubt that there are and will be technical specialists involved in IT, and in the development of new services. One supposes that these specialisms will present avenues of career advancement for some. Against this, it was seen as desirable and necessary that technology should be the servant of the profession (and, a fortiori of the profession's clients, the users of information services), and that it should be absorbed, as far as that was appropriate, into the body of professional knowledge.

6. The core of basic IT training should be the common possession of mainstream information workers, and not the exclusive possession of a specialist elite.

It was remarked above that the common core curriculum should be conservative. This looks odd in an IT context, where the problem really is to fix for a moment something which is in a constant state of change (some would say, improvement). The trouble is that training courses ought not to get too far ahead of their market. If a training school produces graduates whose

technological knowledge is significantly more advanced that the level of technological practice in their region, then those graduates are frustrated, and they may also be held in some disrepute by their colleagues in post. At the same time, they should have enough knowledge, both of specific technologies and of the principles behind them, to be able to keep up with new inventions, and assess the potential for them of new technologies. IT training should therefore be both practical and theoretical, and should concentrate on an agreed area. The RAMP curriculum study then proceeded to try to define this area.

7. The agreed basic syllabus, which can be a harmonized one, should cover a core of studies which covers both theory and practice, and which would provide a basis for the rapid absorption of new technologies - and the user services based upon them - which would appear in the future.

Although in general there might be serious objections to basing important aspects of professional training on the services of imported temporary experts, there is a case for regarding IT as an exception. The spread of IT through the world is extremely wide and the degree of its penetration great; but these remain very unequal. On the other hand, IT clearly has a unifying effect, both because it disseminates information so widely, and because the technologies themselves are the same in all places, and are independent of the actual information held in the system, or of characteristics such as language. It is usually agreed that the international interchange of personnel and expertise is something to be encouraged. Here is a case where such interchange is immediately necessary and actually desirable in itself.

8. It is particularly suitable that IT courses should make use of centrally provided resources and international expertise, both in planning consultation and in finding teaching resources (personnel and hardware).

II. The colloquium themes in relation to IT training

1. The first of the colloquium themes is teaching objectives.

The aim of professional training must surely be the production of self-reliant and self-confident practitioners, at whatever level, who will interact with and support their user groups intelligently and responsively. The RAMP guidelines deal with the question of how to do this at three levels: paraprofessional, professional, and senior management. Acceptance of the overall aim affects all teaching objectives. In particular, it means:

- a balance of practical and theoretical teaching which will enable students to apply fundamental principles to each practical situation, and make correct deductions;

- as far as possible, free access to appropriate hardware and software, so as to allow students both to experience and to experiment, to work creatively, and to apply their theoretical understanding in practical situations;

- there should be components of general and specialised education (as opposed to training) which will help students to place their technological knowledge in wider contexts - for example, they should understand some of the consequences for society at large of the operation of their services, and certainly the consequences for their immediate users.

- course planning, and the conduct of practical exercises, should as far as possible be done in collaboration with professional colleagues in post, services in operation, professional associations, and user groups.

2. Subject matter

The RAMP document emphasises that it does not seek to establish a rigid or universal norm. It sets out in outline a set of subjects for which there is a strong case for inclusion in basic professional formation. The list of subjects was devised with harmonization in mind as a general aim, but it was not proposed that the whole curriculum should be adopted as a component of all training across the professional boundaries. The curriculum was presented as a series of modules and submodules, so that course planners could to a large extent pick and choose. In practice, any particular training course would devise a curriculum which would correspond to the level of technological development available to its region, and to all the other circumstances which would affect its recruitment and output.

It was thought that most courses training programmes would contain some sort of foundation course in IT (distinct, that is, from a general foundation course). The aim of this would be to give a broad understanding and a sense of appropriate context. The two modules suggested were:

- a short course in communication theory, to provide the student with a philosophy, a vocabulary, and a sense of belonging to a world community;

- a survey of IT applications in progress in the world. This would if possible include observation visits to IT installations in parallel services, and institutions not directly involved with information service.

It might be of interest to note that in my own professional discipline (archive and records administration) this is about as far as most training schools have got, in their response to the challenge of IT. These schools are probably finding it more difficult to respond than the schools of librarianship (for one thing, they often do not have the stimulus of a close link with information science training). The progress of harmonization might seem to offer them a way forward.

After this the RAMP curriculum concerns itself with the teaching of specific technologies. The first of these was the group of subjects connected with reprographics. It was considered necessary to insist on the link between this group of technologies (which to some might seem relatively traditional) and the broad field of electronically-based IT. In fact, new developments in reprographics have transformed the systems which produce information materials, in the area of all the information professions. New reprographics have changed the means of book production, of document and record generation, and of disseminating all three types of material, and have introduced or spread new formats and media. Reprographic technologies are attached end-on to most of the electronically-based information technologies. Associated or affected areas are copyright law, current records management and systems analysis. Records management is particularly strongly affected by technologies for creation, maintenance and dissemination of documents, and could be used as a model to demonstrate the effect of these changes on the services offered to users.

The modules proposed include administrative reprographics, micro-reprographics, and publishing. The weight of these elements in any course would naturally be adjusted by reference to the needs of each profession, or of the regional background.

The curriculum then moves on to consider computers and their most common applications. This might be thought the central area of the whole IT field, and it is the one which provides a discipline which could come to serve as the common initiatory or basic training for new entrants to the information professions.

This development would certainly be appropriate in archival training. Traditionally, in older cultures at least, this initiatory discipline has been provided by teaching the auxiliary historical sciences, such as palaeography and diplomatic, which involve learning specific skills. These skills have been held to inform and structure subsequent knowledge about professional practice. It is arguable that the skills involved in learning to use computers could perform the same function, and would have greater relevance to the task of maintaining a specialised information service.

The first module proposed is a course in word and text processing. No doubt this was initially thought of as a simple, practical and rather conservative introduction to more radical forms of computing. In the event, the curriculum turned out much

more interesting than this, and would, if taken in its widest form, by itself provide a fairly complete professional approach to IT.

There are three submodules. The first surveys the field of hardware and software, and would ensure that students became aware of the norms of operation in their geographical region.

The second looks at word processing in organisations, that is as systems for producing documents, and as management systems. It is easy to see some of the natural extensions of this approach, into paperless office systems, management information networks, and the implications of all this for managing an institution (such as a library), or for serving the management of one (as in records management).

The third submodule looks at word processing in information systems themselves, as means of controlling accessions, producing catalogues or finding aids, or carrying on abstracting or indexing services.

The central question in IT training is about computers themselves, and how they are used outside narrowly dedicated systems. It is quite clear that some kind of basic computer literacy is a minimum target. Most people would agree that this should be taught with as big a practical element as possible. There is debate about how detailed or specific the course should be, or the degree to which it is to go into technical depth.

It is probably common ground that there should be a course element on general principles, concepts and terminology. Students need a body of theory on which they can build their understanding of actual technologies, procedures and services. This part of the course would include a survey of hardware and software in general use, and in information work specifically, together with their main uses: data recording, transmission, retrieval. Some of the skills and knowledge needed here are quite fundamental to all information work. For example, a knowledge of the theory of Boolean logic, and of the construction of a search strategy might well fit in here, as well as some study of the interrelation between professional and user in carrying out searches.

After this, course planners must consider practical skills: use of the keyboard, familiarity with one or more systems, and possibly programming. In the discussion on these points, there seemed to be agreement that instruction in a programming language ought not to be included in the core curriculum, but that first-hand experience of using a system would be valuable.

There are many implications for professional studies in this module, and it illustrates well the close interconnexion between IT and all professional practices. Subjects affected by it include the data structure of a description, the composition of a finding aid system, systems analysis and the recording of processes and activity flows.

Three other modules cover computing for information services, the management of computer-produced records, and knowledge about international computer-based information services. Knowledge of a programming language remains as a possible speciality.

Another major curriculum area deals with databases. Students should know, at least in principle, the different kinds of database (bibliographical, abstracting, full-text, expert, etc). The consensus was that the best training practice would be to give students some practical experience in the use of a database, including knowledge of a command language. Since it was very likely that the students would in later practice be involved to some degree in the use or design of databases - for example, they might find themselves involved in setting up or using a local one - there should be attention paid to questions of design, management and study of user needs.

To complete the subjects involved with computing, a final module was proposed which presented a course in data storage technology.

The next group of subjects dealt with telecommunications applications in information services. With these, we are moving further away from the common experience of information workers, both in north and south, particularly from that of archivists and records managers; but nevertheless, the implications of these technologies for future information work are considerable, and as with the more central subjects, there are many implications for the re-interpretation of traditional practices, and for developing user-related consultation habits.

This group of subjects also calls for a foundation course geared to providing a philosophy and a contextual understanding. The function of communication channels in society is involved. Students should understand the difference between digital and analog systems, and the nature of networks, and they should have an idea of the state of technology world-wide, particularly as they have affected services offered to users. After this, course directors may choose to include modules dealing with particular areas.

One such concentrates on telecommunications, and goes on to deal with the applications of these in library or information service. Specialist services may need to know about the management of particular media, such as audio, video or film. All three professions and their users are affected.

Overall, the body of information contained in these modules is considerable. Bringing this group of subjects into professional training and preparation for mainline information service has radical implications. Course planners who took on the whole lot would of course find themselves involved in a complete revision of the school's programmes, and would also find major problems in resourcing. No doubt most schools will have to face this kind of re-evaluation in the next few years, if they have not done so already. For the moment, a judicious selection of the most

appropriate modules might help to postpone the day of reckoning.

3. Teaching methods

Teaching method, naturally, is determined firstly by the needs of the target student group. When IT is introduced, two of these groups come into prominence at first.

It is likely that for some years after IT first becomes important to information professionals in any particular place, there will be an overriding need to concentrate on continuing education and updating or recycling courses. The re-education of professionals in post may for some time be the most pressing need. The teaching methods appropriate to these must take account of the experience and status of the participants, the (probably) short time available, and the circumstances of the training course. As a generalisation, one would expect the most appropriate teaching style to be the most open one possible, and the practical bias of the course to be dominant.

In some ways, updating courses and continuing education present fewer problems than those of re-equipping training schools and restructuring their courses. Central provisioning can be used, and it is possible to plan for short courses, special missions and collecting hardware and materials in central locations. The work of the Portuguese association for librarians, documentalists and archivists provides a useful model. This association has acquired a small but useful installation of simple hardware and software in its teaching accommodation, and uses this as a basis for an annual programme of courses.

The second group which may be prominent in the early stages is that of the paraprofessionals. The people who introduce IT systems into information services will of course be specialists and/or professionals in management posts. The people who are actually going to operate the hardware are presumably para-professionals. The immediate training of these becomes a problem connected with the introduction of the service (though of course it is likely that there will be a continuing need for trained paraprofessionals as the service develops).

In one way, practical training in the operation of specific technologies may be the easiest kind of IT training to provide. Certainly, there is little point in introducing a technological service unless a solution has been found to the problem of training operators. The training of professionals who can maintain and manage the service subsequently is a question that can perhaps be postponed.

However, in another way, the problem of designing a suitable course or courses is not quite so simple. Operators are or should be not mere mechanical button-pushers; they should be facilitators, on-the-spot shop-floor managers. Therefore they

should have an understanding of the theory at work behind their technology, should know the technical language, and appreciate its aims and purposes. Imparting all this means that the training course should include professional subjects, should be designed on liberal lines, and taught in a relatively open fashion.

Designing a technological course for paraprofessionals also involves a realisation that for some, this will be a means of promotion. There will be a need for technical specialists, and for people who can manage technologically-based services. The way into this may often be from the ranks of the line operators.

Another special group which must have some consideration is that of people training for senior management. For this group too, technology may offer an avenue for career advancement. Even where that is not the case, a suitable command of IT will be a requirement for those who will have to evaluate the need for a technological development, make the case for it, undertake the necessary studies and make the decisions, and then oversee its installation and use. Such people must have a very sound grasp of the theory beneath IT, and the means of access to state of the art information. Training courses for them may perhaps demand less of an investment in hardware but will certainly need very good channels of communication with leading centres and sources of information.

There remain the essential stock in trade of professional training schools, the courses for initial entry of mainstream professionals . The RAMP curriculum makes some recommendations on teaching styles and installations for these. It remarks that open teaching styles and seminar methods are more suitable than formal lecturing, and that the furnishing of teaching rooms should reflect this. Then there is the question of technological hardware. A well-equipped training school will doubtless have teaching laboratories with batteries of terminals. But these rooms usually look rather like very formal lecture halls. Is there a study of teaching styles in IT laboratories? There would seem to be a need for one.

An aspect which is sometimes overlooked, but which is suggested by the comment made above, is that there may well be a need for training the teachers of IT and IT-related professional courses, not only in the technologies themselves and in their professional application, but also in their effects on pedagogy. As with general updating and continuing courses, a programme for this can use central resources and imported expertise. It would be desirable for specific provision for the training or retraining of teachers of professional subjects to be made in the overall plan.

4. Evaluation

Student success is the most obvious test of a teaching programme, just as user service is the test of an information system. The RAMP curriculum makes suggestions for examination method. In some cases a traditional written examination is recommended. This method might be appropriate with the foundation course, containing subjects which can usefully be discussed in narrative essays. The same applies to foundation or theoretical elements in the more strictly technological subjects.

Examination of the course elements which demand knowledge of a system are best examined by allowing students to create their own output from the system. If students can use it for their own purposes, they are at the beginning of being able to evaluate it for other professional purposes. In other cases seminar contributions and other course work would be the best test.

The evaluation of the whole course and its products may often be best done by the professional association. In carrying out this evaluation, which might be either formal (through a qualifications committee or the like), or informal (at a conference, or debate), the associations should make efforts to obtain international comparisons, or comparisons with parallel professions. IFLA has led the way in this, and its work would be of value to anyone engaged in studying the status of qualifications. Because perceived status is so important to the success of information services, it is important that examination or validation programmes should be rigorous and public. The ultimate test is the status and effectiveness of the user service which is the end result.

5. Teaching resources

It is obvious that the biggest initial problem facing a training school in connexion with IT is the question of investment in hardware. It is not simply the equipment itself: the provision of laboratory space, and layout within this space, may be such a dominant feature as to amount to a refoundation and redesign of the school itself. In many parts of the world such a radical refoundation would not be practicable.

Yet to what extent is a minimal and conservative investment in IT a better proposition? If a school cannot acquire the equipment which will facilitate a redesign of the course work to provide a strong element of student practicals, then the next best thing may be to buy a cheap microcomputer, and allow each student a half-hour's acquaintance with it. As a matter of fact, even such minimal exposure as this is likely to result in radical reassessments of the principles behind the professional subjects being taught - which would be a very well worth while objective. Equipment centrally provided by the professional association could be used for this, perhaps in a context of short courses. Solutions

like this have the advantage that they may emphasise the close connexion between the professions and the user services they staff.

The answer to these questions of resourcing may also lie in the attitudes of the teaching staff. If they themselves can absorb the effects which IT has had upon professional subjects, and make efforts to pass on these effects to their students, lack of free access to the hardware may not be such an important defect. All the same, IT is the basis of a group of subjects which does demand good access to the systems - access sufficiently free to allow individual (or at least small-group) student experimentation and a chance for students to evaluate user response.

Investment in hardware ought to be accompanied by investment in suitable software, which in principle ought not to be a system crudely adapted. In practice, adaptations are usually necessary and sometimes highly successful, all the more so if they are local adaptations which respect the real aims and needs of local information services.

Access to national or international databases is a desideratum if there is to be training in this subject. Although it would be less expensive and difficult to set up the means for this than it would be to provide the means to resource a basic course in IT, this particular facility may in practice be less feasible. Initial investment in teaching hardware may sometimes be achievable by means of a grant from a funding agency or a development aid scheme. Finding a source for regular payments in foreign currency may well be quite significantly more difficult. In some cases the problem may be solved by using operational access points in free time.

In this group of subjects, bibliographical resources are not so important. Relevant printed material may not exist in large quantities. Overall, IT literature - including dedicated journals - is very large, but it is important to set up a filter which will allow through only the material directly relevant to the professional studies involved, and the specific systems in use. Access to a large library system is perhaps the ideal, but in this case the teaching ought to give well structured advice on reading. Smaller schools will find this a difficult problem.

III. Future developments.

IT is relevant to, and cannot be ignored by, any of the three information professions. In library work, computers can be used (among other things) for co-operative cataloguing, and inter-library loan; in information science, for access to expert systems or databases; in archives administration for finding

aids, repository management and data exchange; in records management for the control of documentation within the organisation. It is argued in this paper that if this is so, then IT must also be an essential feature of training programmes. Where this has not yet been recognised, it is time for new thinking and planning for new investment.

The investment necessary for equipping training schools for IT may result in the reinforcement of harmonized provisions, the more so since in many cases the re-equipping of training schools would have to be a result of a clause in the national development plan. Training the three professions together would presumably offer savings in this regard. However it is necessary to remember that the main professional subjects should still be taught in separate streams. IT permeates the professional subjects and changes them, but it does not bring them closer together. Cataloguing books and classifying documents does not resemble arranging and describing archives, even though in both spheres the professionals use the terminology and techniques of data structure, online search, disk storage.

However, there are some common tasks which can be done co-operatively between the professions, the need for this co-operation is pointed up by the coming of computers. That part of information science known as information retrieval, with, in particular, indexing theory and thesaurus construction, should now be developed in co-ordinated schemes. Local or regional schemes for databases should seek to consult interests in all three professional areas.

To illustrate this, the experience of the author in archival development can be quoted. There are now many archival online databases. Some are dedicated, such as the one designed and run by the State Archives of Italy. Some are used in collaboration with librarians, such as the big American databases, OCLC and RLIN. In both cases, vocabulary control and the provision of authority lists is proving to be a difficulty. Archivists do not usually find ready-made subject classifications useful, and in most countries they do not yet have established cataloguing rules.

In several parts of the world one can see the independent growth of movements to set up rules and authorities for archival description which truly meet the needs of archivists. The criteria suggested by the recent publication of the Canadian archivists, Toward Descriptive Standards probably summarize most adequately those needs. The parallel publication of the British Society of Archivists, the Manual of Archival Description (MAD) may also be cited. Rules for description ought to be backed by other forms of authority, including subject headings, vocabulary lists and thesauri. These enterprises in turn should probably be well supported by training in information retrieval theory and practice. The result, when this is achieved, ought to be a reinforcement of the notion of the information community.

Progress in harmonized training in IT

After all this discussion, it is rather humiliating to report that the present author does not know of a single definite case where there is a truly harmonized IT training curriculum in use. (This of course does not mean that there is not one). Recently founded or newly proposed information training schools, are naturally based upon the principle of harmonization, because in these circumstances the economic advantages are undeniable. This was true in the African training schools of the 1970s, such as Dakar and Ghana; and the newly planned schools in Nigeria, Kenya and Central Africa are following the same route. However IT is particularly difficult to fund and run in Africa, and none of these schools is properly equipped for technological development. Latin America also holds a number of harmonized training programmes, but equally finds the investment difficulties daunting.

In previous times, we would have expected a lead in this area from Spain, where the tradition has been to train archivists, librarians and information scientists together; but unfortunately at the present time the training provision for at least some of the information professions has been suspended. Portugal has a better tradition, with courses in three universities, and at least the beginnings of an investment in training hardware. Perhaps the best examples are those set by the newly established schools of information training in North African Arab countries.

In Britain and Ireland, it is depressing to note that although several of the schools of library and information studies are now reasonably well equipped, there has been no attempt whatever to consider the benefits or the effects of harmonizing courses with the five archival training courses. Leaving the harmonization question out of account, most archival training courses in Europe have introduced courses in IT, but in most cases have not yet begun to consider the nature of an IT-oriented training course.

It is clearly time for organised discussion of the changes which the spread of IT has made and should make in the planning of initial professional training. The international organisations - UNESCO and the three NGO's - have made a strong and sustained effort in this direction. The next step must surely be structured consideration at national level.

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